December 12, 2005

CALL FOR SUBMISSIONS (CFS)
CFS Number 2067DES

California Department of Transportation, Division of Division of Engineering Services
2006-2007 Research Problem Statements and Proposal Guidelines

A CONTRACT MAY OR MAY NOT BE AWARDED FROM THIS CFS.

The Division of Engineering Services, DES (Division) of the California Department of Transportation (Department) is requesting research proposals from public research institutions: public colleges, universities, and government agencies to address the Department's research problems. Respondents are encouraged to engage in collaborations with industrial and public agency partners, and to consider how the results of their research can be communicated to those who deploy and operate transportation systems (technology transfer). However, direct submittals from private universities or institutions cannot be accepted. Subcontracts with private entities are also subject to certain conditions.

This Call for Submissions (CFS) is based on problem statements derived from customer needs. The CFS focuses on the application of solutions to meet the Department's mission of improving mobility across California. This research will specifically address the following Department goals:

· SAFETY: Provide the safest transportation system in the nation for users and workers.
· MOBILITY: Optimize transportation system throughout and provide dependable travel times.
· DELIVERY: Improve delivery of projects and services.
· FLEXIBILITY: Provide mobility choices through strategic partnerships.
· STEWARDSHIP: Preserve and enhance California's resources and investments.

Public agencies are invited to review and respond to this **CFS Number 2067DRES**, entitled, **"California Department of Transportation, Division of Engineering Services 2006-2007 Research Problem Statements and Proposal Guidelines**". Unlike prior releases of the DES CFS, there is not a pre-proposal phase in CFS 2067DES. Once a proposal has been accepted, successful respondents will need to submit a fully developed bid with clear scope of work linked to timelines (in weeks, not specific dates), milestones and deliverables, and each line item in the budget fully justified within the bid.

Please see the schedule in the Proposal Submission/Evaluation Process section below. In submitting your documents, you must comply with the instructions found herein. Reference the attached CFS for detailed information regarding:

If you have questions, the contact person for this CFS is:

Saad El-Azazy, Ph.D., PE,
Seismic Research Program Manager
Office of Earthquake Engineering
Division of Engineering Services
California Department of Transportation
Email: saad_el-azazy@dot.ca.gov
Fax Number: (916) 227-8898

Interested parties should submit electronic documents to:

Saad El-Azazy, Ph.D., PE
Email: Saad_el-azazy@dot.ca.gov

This CFS contains the entire terms and conditions relating to the research problem statements, and no other terms, conditions or representations should be considered unless issued in writing as an addendum to this CFS.

Proposals must be received no later than 5:00 PST on **February 10, 2006**

TABLE OF CONTENTS

I. Background

The California Department of Transportation (Department) manages interregional transportation services; more specifically, the Department has the traditional role of owner and operator of the 15,000 mile State Highway System. The Department promotes California's economic vitality and enhances its citizens' quality of life by providing for the movement of people, goods, services and information. The Department is responsible for the delivery of the State's Transportation Improvement Program; planning, designing, building, operating and maintaining California's state highway systems. In addition to a changing mix of transportation modes - such as highways, rail, mass transit, bicycle, pedestrian, and aeronautics, the Department coordinates the solutions to complex issues such as land use, environmental standards, and the formation of partnerships between private industry and local, State and Federal agencies to promote productivity, reliability, safety, flexibility and performance in the State of California. For more information see: www.dot.ca.gov

The Department has developed a research process guided by the Research and Deployment Steering Committee (RDSC), consisting of Deputies and District Directors. The RDSC, in turn, created Program Steering Committees (PSCs) and Technical Advisory Panels (TAPs) to assist in developing the research agenda and deploying research products.

The functional Division Chiefs lead the PSCs, and together form the Research Deployment Advisory Committee (RDAC) to advise the RDSC. Senior staff from those Divisions lead the TAPs. The TAP members can include technical experts from Divisions, Districts and external agencies. The TAPs developed the enclosed problem statements, and will review and rank resulting research proposals. The PSCs and the RDSC will make the final determination on which proposals will become research projects. With this system, the Department hopes to provide more customer participation throughout the research process, and ownership of research products.

II. Research Needs

Highlight issues in this CFS are:

- The CFS2067DES is organized according to Division's customers' needs within the Department, including:
    - Issues related to Bridge Structural Design, Bridge Structure Construction, and Bridge Structure Maintenance.
    - Issues related to Geotechnical / Foundation Engineering.
    - Issues related to Earthquake Engineering.
- Respondents should demonstrate how their proposals would benefit the traveling public and contribute to meeting the five Department goals.
- The CFS identifies important problems that need to be solved, but generally does not specify how those problems should be solved. This will allow respondents the flexibility to propose new and innovative solutions.

- Proposals need to be focused toward implementation of their results to improve transportation.
- In order to promote synergy among diverse research projects, respondents should consider how their projects could be integrated with other research projects, as well as transportation planning and deployment projects, in specific California regions or corridors.
- Department staff will work with the proposal authors to strengthen the project's implementation effectiveness and to facilitate their integration with other new and ongoing research, planning and deployment projects.
- Multi-disciplinary and multi-campus research teams are encouraged in order to integrate diverse research capabilities.

III. Proposal Format and Content

The research proposal should provide a detailed description of the research to be undertaken. The body of the proposal will be limited to **twenty (20) pages at the maximum**, not including curriculum vitae or appendices. Each proposal, including curriculum vitae, budget, timeline, appendices and cover page, must be in a single file, either in PDF or Word format. (No zipped files) The proposal should contain the following information and be presented in the following order:

1. Cover
2. Executive Summary
3. Table of Contents
4. Research Plan
    a. Introduction
    b. Problem
    c. Background/Business Case
    d. Research Approach
    e. Anticipated Research Results and Benefits of Research
    f. Deployment Plan
5. Research Team
    a. Qualifications
    b. Accomplishments
    c. Other commitments
6. Equipment and Facilities
7. Work Time Schedule and Deliverables
8. Itemized Budget
9. Partnerships/Subcontracts
10. Appendices
11. Vitae

1. Cover Page
The cover page must include the date, problem statement number; proposal title; lead researcher's name, affiliation telephone number, email address and address; key supporting researcher(s) name(s) and affiliation(s), name and address of the organization with which a joint venture is proposed, if such is the case; the name and title of the person formally submitting the proposal; the name(s) and title(s) of the proposal author(s); the project duration; project budget for each fiscal year and a total budget. See **Figure 1.**

2. Executive Summary
The Executive Summary should be a concise, easily understandable presentation of the proposal in two pages or less. Each item from #4 through #10 above should have a separate heading and a brief description.

3. Table of Contents – Reference Page

4. Research Plan -
The research plan shall be subdivided into the following sections:

(a) *Introduction.* The introduction to the research plan should provide a concise overview of the respondent's approach to conducting the research. It should describe the manner in which the expertise and experience of the proposed team will be used in the research, and the application of special data, facilities, contacts, or equipment should be presented. The introduction should highlight the linkages of the proposed team's capabilities to the project tasks and the manner by which the proposed plan will satisfy the objectives.

(b) *Problem.* Provide a technical description of the problem, and why a solution is needed.

(c) *Background/Business Case.*
- Review related/complementary research completed or underway in the problem area. (Literature search)
- State project scope, objectives, and motivation, in light of the Department's goals.
- Describe the impact of the proposal on the existing transportation issue/problem/need.
- Identify the anticipated customers/users.
- Discuss why this research project is considered essential to the improvement of California's transportation system.
- Describe the consequences for the Department and its customers if the problem/opportunity is not addressed.
- Provide a benefit/cost assessment, which shows the benefits that will be derived for the ultimate product that is the subject of the work.

(d) *Research Approach.* This section will be used to describe the proposed methodology of the research and how the objectives will be achieved through a logical, innovative, and rational scientific plan. The plan shall describe each phase or task of the research to be

undertaken. Explain the proposed research methods in sufficient detail to enable evaluation of feasibility, originality and significance of the proposal.

If appropriate to the content of the proposal, describe the current technology that is the subject of the proposal. If the research project involves selection of a specific technology solution from among multiple alternative approaches, explain the reasoning behind that selection.

- Describe the alternatives.
- Identify the alternative that best satisfies the objectives.
- Explain why the selected solution was picked over the other alternatives.

(e) *Anticipated Research Results and Benefits of Research.* The research plan for each proposal shall contain specific statements describing the anticipated research results. The results are expected to be presented in terms of the language and working tools of the practitioner or administrator so as to be immediately applicable to practice. Consequently, there must be specific statements of the manner in which the desired results would be reported, e.g., mathematical models, design techniques, field or laboratory test procedures, or recommendations for changes in Department policy, practices, procedures, or standard highway specifications.

(f) *Deployment Plan.* DES projects are intended to produce results that will be applied in practice. Therefore, proposals and the project final report must contain a deployment plan for moving the results of the research into practice. Refer to the "The Department's Five Stages of Research Deployment" for guidance when developing deployment plans. See **Figure 2**. Under Item 4(f), each proposal must include a Deployment Plan that describes activities to apply the product of this research. It is expected that the deployment plan will evolve during the project; however, proposals must describe, as a minimum, the following: (a) the "product" expected from the research, (b) the audience or "market" for this product, (c) a realistic assessment of impediments to successful deployment, (d) the institutions and individuals who might take leadership in applying the research product, (e) the activities necessary for successful deployment, and (f) the criteria for judging the progress and consequences of deployment, and (g) a projected schedule for major tasks.

If the nature of a project is such that it is known initially that the results will not be amenable to immediate deployment into practice, the research plan must include realistic recommendations for the additional work necessary to reach the deployment stage.

5. Research Team

When relevant, highlight the contribution of research collaborations (across disciplines and campuses or with private sector) to the project.

(a) *Qualifications of the Research Team*— The proposal must describe how the research team members' academic, industrial, and/or research experiences relate to the project to be undertaken. (Contact information for all researchers should be on the title page, leaving this section for background and skills each researcher brings to the project. This

should NOT be a copy of the Vitae, but a succinct summary of those skills and experiences that contribute to solving the problem being researched.)

(b) *Accomplishments of the Research Team*—Proposals shall contain a summary of the past accomplishments ("track record") of the research team in the same, or closely related, problem area of the project to be undertaken. This summary is to include full particulars concerning all known instances of application to practice of the agency's research results. If no such knowledge exists, it should be so stated. (Again, this should NOT be a copy of the Vitae, but should bring specific accomplishments that will contribute to the success of this project)

(c) *Other Commitments of the Research Team*—Proposals shall contain a listing of current organization and personnel commitments to work on this project and to work other than this proposed project. The description shall be provided in sufficient detail to indicate that the organization and all of the individuals assigned to the proposed project will be able to meet the commitments of the proposal. Staff-hour commitments and percentage of time committed to this project and to other work for each member of the proposed research team shall be specified.

6. Equipment and Facilities

This section shall include a description of the facilities available to undertake the research and an itemization of the equipment on hand that will be used to complete the research. In the event that use of the facilities or equipment is conditional, the conditions should be described. In the event that certain facilities or equipment are considered necessary to undertake the research but are not on hand, that fact should be presented. The respondent should identify any arrangements that will be made to purchase, borrow or rent necessary equipment. Letters of commitment should be included in the appendices to indicate the availability and commitment of equipment. Rental rates should be included in the budget for equipment to be rented. In the case where it is contemplated that additional equipment will be purchased under project funds, be certain that the budget item "capital equipment" indicates this and a detailed price list is included in the proposal.

7. Work Time Schedule and Deliverables

For planning purposes, contracts will be scheduled to start **November 1, 2006 or later**. The time required to complete the research project shall be specified. Proposals will not be rejected if the proposed time does not match the time specified in the problem statement. However, any differences must be justified. In addition, a schedule shall be included that shows each phase or task of the work, when that phase or task will begin, how long it will continue, and when it should end. The schedule and timetable should clearly delineate the points in time where project deliverables and reports are planned. Any internal requirements that could effect the schedule should be delineated or stated as a contingency etc. (i.e. Board approval needed for human testing, etc.)

At the conclusion of the project, the researcher(s) will deliver a final report and present his/her research results to the Department in a workshop forum, including a full explanation of the applied usefulness of the research. This may be done as a single-topic

workshop or bundled with other related topics. (Expenses for this workshop shall be included as part of the Budget.)

8. Itemized Budget

The estimated cost for the project should be based on the proposed performance period. Lump sum estimates are not acceptable; budgets shall be detailed and itemized.

The budget table must include hourly breakdowns for every principal member of the research team, including consultants and subcontractors. Actual hours should be shown rather than months or dollars. In addition, it is preferred that only one table be submitted rather than separate tables. The table should be located immediately behind the *Itemized Budget.*

Budget categories must include at minimum: number and type of personnel, equipment, supplies & expenses, travel, and overhead. Furthermore, each equipment item must be specifically identified. All overhead type of expenses must also be detailed and justified; e.g., benefit rates, etc. Please note that in addition to the total proposed budget, a breakdown by category is required for each fiscal year, which runs from July 1 to June 30. (Note: Contract start date should be November 1, 2006 or later.)

Once a proposal has been accepted, successful respondents will need to submit a fully developed bid with clear scope of work linked to timelines (in weeks, not specific dates), milestones and deliverables, and each line item in the budget fully justified within the bid. Any funding changes between the proposal and full bid must be justified in the full bid, and significant increases may subject the full bid to rejection.

9. Partnerships/Subcontracts

If assistance in the form of personnel, data, or equipment, etc is required from other agencies, public or private, describe the plans for obtaining such help or information. In the case where cooperative features play an important part in the conduct of the research, a letter of intent from agencies agreeing to provide cooperative features should be included in the appendices.

10. Appendices

The appendices may include such things as letters of intent from agencies agreeing to provide cooperative features, or letters of commitment regarding any arrangements that will be made to purchase, borrow or rent necessary equipment.

11. Vitae

Customized Curriculum Vitae for each member of the research team, highlighting only those items that are pertinent to this research proposal. The Vitae including a list of publications and awards should **not exceed two pages per researcher.**

IV. Questions and Answers

Respondents with questions about the requirements of this CFS must submit those questions in writing to the email address shown below, and by the dates referred to in **Schedule**. Question submittal must include the individual's name, the name and address of the research institution. Questions will be received and answered electronically by:

Saad El-Azazy, Ph.D., PE
Email address: saad_el-azazy@dot.ca.gov

V. Proposal Submission/Evaluation Process

Proposal Submittal, Modification, Resubmittal, and Withdrawal

Proposals should be emailed, with the CFS# and Problem Statement# in the subject line, and Project Title and Respondent's Name/Research Institution in the email text. Respondents are to submit proposals to:

Saad El-Azazy, Ph.D., PE
Email address: saad_el-azazy@dot.ca.gov

Respondents submitting proposals may modify or withdraw the proposal at any time prior to the submittal deadline. Such modification or withdrawal of a proposal shall be in writing and submitted by the same person submitting the original proposal.

If the modification requested is only an addition to a proposal, a modified copy of the proposal should be emailed, with the CFS# and "Addition To (Problem Statement # and project title)", in the subject line.

Evaluation Process

The proposal evaluations will be completed by the Department's Technical Advisory Panels (TAPs) and Program Steering Committees (PSCs). The Department's Research and Deployment Steering Committee will make final selection. Proposals will be screened against the evaluation criteria below.

Proposal Evaluation Criteria

- Organization: Adheres to requested page limits and outline? Is the proposal well written?
- Research Plan: Comprehensive literature search completed? Are the plans, methods, techniques and procedures feasible, clear, valid, adequately referenced, and state-of-the-art? Are the research results valuable to the Department?
- Research objective: Are the stated objective, scope and motivation clear, valid, and logical? Responds well to problem statement and meets Department goals?

- Deployability of research outcome: When will the ultimate product(s) that is the subject of the research be available, and is it likely to be deployed? (See **Figure 2**)
- Qualifications: Are the qualifications, capabilities, and experience of the proposed lead researcher and other key personnel sufficient to achieve the proposed objectives? If applicable, is proposed facility adequate for proposed work?
- Budget: Does the budget reflect the actual needs of the proposed work? Have the requests for personnel, equipment, supplies, etc. been fully justified? Have cooperative features, partnerships and subcontracts been fully identified?

Acceptance and Rejection of Submissions
DES retains the right to disregard a minor deviation from the requirements and may, at its sole discretion, request supplemental information or clarification of that information submitted.

Negotiations with Selected Respondent
Once a proposal is submitted, DES may elect to negotiate with the selected respondent, leading to a written Agreement with DRI about implementing the proposal. Any agreement as a result of this CFS will be subject to all necessary State, Federal and Agency approvals. If an agreement cannot be reached, negotiations will cease and no contractual agreement written or implied will exist. DES will not reimburse submitting organizations for any costs incurred in the preparation or submission of pre-proposals or proposals, or in the negotiation process.

This CFS shall not commit DES to negotiate and execute any Agreement. DES reserves the right to accept proposals that, in the sole judgment of DES, are in the best interest of the State and regions. DES reserves the right to reject any or all proposals or to modify or cancel, in part or in its entirety, this CFS.

VI. General Information

Confidentiality
Proposal submittals are confidential. Selection committee members shall discuss the evaluation proceedings and content of proposals only with DES staff and with members of the selection committees. Proposals that are not selected will not be reprinted or used for purposes not pertaining to this CFS process. Information on proposals that are selected will not be released until a contract is in place.

Amendments to this CFS
DES reserves the right to amend this CFS by addendum prior to the final date of proposal submission.

Schedule
The schedule related to this CFS is as follows:

EVENT	DATE
CFS available to prospective Respondents	December 12, 2005
Proposal Written Question Submittal Deadline	January 27, 2006
Responses to Questions	February 3, 2006
Final Date for Proposal Submission	**February 10, 2006**
Proposal selection	May, 2006

VII. Research Problem Statements

This section outlines the DES's research needs within the following categories: Advancement in Earthquake Engineering, Bridge Design & Construction, Maintenance, Transportation Safety & Mobility and Innovative solutions.

The following is a list of problem statements:

05_EQ001 Multiple-Support Response Spectrum Analysis of Bridges

05_EQ002 Response Spectrum Method for Near-Field Ground Motions

05_EQ003 Development of Methods and Technologies for Remote Monitoring of Bridge Performance for Assessment of Post Event Damage

05_EQ014 Assessment of Reliability and Durability of Seismic Response Modification Devices in service

05_EQ018 Pre-stressed Structural System for Smart California Bridges (PRESS-Bridge) Exploratory Study

05_EQ019 Develop Guidelines for Post-Event Bridge Damage Mitigation

05_EQ021 Development of Improved Nonlinear Static Procedure (or Pushover Analysis) for Seismic Design and Evaluation of Bridges

05_EQ027 Development of Pre-cast Columns and Beam Systems for Rapid Construction of Bridges in Seismically Active Regions

05_EQ066 Development and Validation of Design Guidelines for Bridge Systems supported on Spread Footings Allowed to Uplift during Earthquakes

05_EQ086 Development of Fragility Curves for Liquefaction Screening of Caltrans Bridge Structures

05_EQ089 Rapid Construction of Bridge Piers with Improved Seismic Performance

05_EQ096 Pre-cast Bridge Pier Columns with Energy Dissipating Joints

05_EQ122 Seismic Design Guidelines for Bridge Column Piers on Pile Supported Foundations Allowed to Uplift

05_EQ124 The Effectiveness of Ground Improvement Techniques to Mitigate Liquefiable Soil

05_EQ138 Development of a Non-Destructive Damage Evaluation Method to Evaluate Piles after a Seismic Event

05_EQ151 Innovative Economical Foundations with Improved Performance that is less sensitive to Site Conditions

05_EQ159 Determine the Vulnerability of California's Bridges to Tsunami

05_EQ160 Seismic Performance of an I-Girder to Inverted-Tee Bent Cap Connection

05_GS024 Determine the amount of inherent column cage stability for erecting bridge column cages during construction based on current fabrication practice

05_GS035 Live Load Distribution to Integral Bent Caps in Framed Box Girders

05_GS129 Development of Maintenance Inspection Practices for Earth Retaining Systems

Figure one
Example Cover Page

COVER PAGE

Problem Statement #	(Use number on problem statement)
Title	_____
Proposing Organization:	(Use name that will appear on contract; include address and telephone number)
Person Submitting Proposal:	(Name and title)
Proposal Written by:	(Name and title)
Proposal Date:	_____
Principal Investigator:	(Name and title, business telephone number and e-mail address)
Additional Investigators:	(Same info, as many as needed, include all team members)
Administrative Officer:	(Name and title, business telephone number and e-mail address)
Proposed Contract Period:	(In months)
Fiscal Year 2006/07 Cost:	_____
Total Cost:	_____

Figure two
The Department's Five Stages of Research Deployment

1. CONCEPT STAGE
• First steps following Problem Statement and Proposal
• Includes detailed literature search
• Involves experimental design, data collection, analysis and reporting
• Assesses results of research
• Defines barriers to implementation (e.g. policies, specifications, standards)
• Submits a Final Report and outlines a recommended implementation plan

2. LABORATORY PROTOTYPE STAGE
• Develops breadboard circuit or computer system modeling
• Demonstrates operation in laboratory setting
• May incorporate customized or one of a kind components
• Assesses results
• Submits Final Report and recommends design of full scale demonstration

3. CONTROLLED FIELD DEMONSTRATION STAGE
• Prepares for full scale testing of demonstration project
• Includes collaboration with outside agencies or other state DOTs and US DOT
• Controlled tests at specialized facilities are observed and supported by cooperating agencies, industry and technical associations
• Potential end users are enlisted to support the field pilot stage
• Assesses results
• Submits Final Report and recommends site/conditions for first application pilot stage

4. FIRST APPLICATION (CONTRACT) FIELD PILOT STAGE
• Works with potential end users to select site and to conduct pilot testing under real world operating conditions
• Test specifications and standards are developed
• Research assistance given to assure proper installation and operation
• Problems are corrected and adjustments made, as necessary, to complete pilot testing
• To the extent possible, potential end users operate the project under careful research surveillance
• Assesses results
• Submits Final Report and recommends initial sites for full corporate deployment

5. SPECIFICATION & STANDARDS WITH FULL CORPORATE DEPLOYMENT STAGE
• End users select site(s) and deploy the method/process/equipment using resident management, supervision, staff, and contracting forces (where applicable)
• Deployment is without research supervision or direction
• On call assistance is available upon request
• Assesses results